3. Recommendations:

The Task Force offers the following recommendations to the Board of County Commissioners for implementation:

1. **Proactive Approach to Flood Protection.** Preventing flood damage requires continuous vigilance, coordination among several levels of government and an accountable institutional framework. This is especially true in Miami-Dade County where municipal, county and regional facilities all must be operated in harmony for the system to work. The Task Force recommends:

a. The county staff should establish a flood control liaison with the South Florida Water Management District (the District) to monitor conditions within the canal system and notify the District when action is needed to lower flood risk in the county. If appropriate action is not taken, the County Manager should be notified.

b. At least once each month from June through October the flood control liaison for the county should participate in a conference call with the District and the US Army Corps of Engineers (the Corps) staff to assess the system's vulnerability to flooding and take discretionary actions to relieve any conditions that could make matters worse should a tropical storm or hurricane strike the area.

c. The Board of County Commissioners should direct the county staff to provide them with a semi-annual status report regarding the progress of implementation of the District Implementation Plan and the report of the Miami-Dade County Flood Management Task Force.

2. **Wet Season Procedures.** In order to ensure that flooding is minimized during a hurricane, tropical storm or similar high rainfall event, the system must be operated in an appropriate manner well in advance of the weather service's ability to predict a problem.

The coastal flood control structures are presently operated at the low wet season stages authorized by the Corps. Prolonged periods at wet season stages lower than those approved by the Corps could have a detrimental effect on the county's water supply.

Therefore, it may not be possible to lower seasonal water levels any further to minimize flood potential in eastern Miami-Dade County. Other structural responses to increase coastal outlet capacity are addressed later in this report.

Operation of the canals in the western sections of the county has become very controversial due to the conflict between the canals' original purpose of flood protection and the present emphasis on environmental protection. The operation of the District canals west of U.S. 1 controls water levels for the western areas of the county. Because of the proximity of the canal system to Everglades National Park and Florida Bay, water control operations have the potential to create a significant negative effect on the Park and Barnes Sound. Minimizing flood damage solely through the implementation of single focus flood control operational policies could produce negative impacts to the water supply and to sensitive ecosystems in the region, and would not be allowed under today's state and federal environmental protection laws. Therefore, making a proposal to lower seasonal water levels to minimize flood potential in the south Miami-Dade area without assessing other impacts is unrealistic. Nevertheless, because of the essential role of the canal system in reducing flood damage, the Task Force recommends the following approach:

a. During the hurricane season, canal water levels should be held at the lowest feasible authorized level in areas which depend on groundwater storage control and the District canals for primary flood protection,

b. When conditions do not permit the lowest feasible level to be attained under the authorized operations schedule, then exceptions to authorized operations schedules should be actively sought to decrease the potential for flooding. The procedures outlined in the U.S. Army Corps of Engineer's Master Water Control Manual (7-11) provide the requirements for obtaining deviations and operational schedules.

3. **Flood Control Pumping to the East.** The most populated areas in Miami-Dade County are dependent on gravity driven spillway structures for the primary flood control. Since land elevations are so low, the tidal cycles influence how much flow can be removed in the critical hours after a heavy rain. The county has little or no flood control capacity during high tides. This results in sanitary sewer overflows bypassing drainage systems in the urban areas, which results in additional pollution of Biscayne Bay.

The County and Water Managers should develop a forward pumping design for the county's coastal canals that will ensure that some flow is maintained during high tide. This should not result in an increase in the water quantity flowing to the Bay but could significantly improve the water quality by reducing sanitary sewer overflows and maximizing the use of drainage system treatment processes. Water quality should be an integral part of the planning process, as well as a determination of how forward pumping will affect Biscayne Bay. The Miami-Dade County Flood Management Task Forces recommends:

a. The county should work with the District to conduct a feasibility study to determine the effects of forward pumping from all canals in the county and work to implement feasible recommendations.

4. **Back-pumping and New Structures for the Tamiami Canal.** It has long been recognized that additional flood control capacity was required in the western portions of the county from Kendall Drive to Okeechobee Road, in order to provide those areas with a level of flood protection comparable to that enjoyed in the eastern area of the county. At the inception of the Central & South Florida Project (C & S F Project), back-pumping excess stormwater from these areas to the water conservation areas was a key feature proposed in association with the anticipated westward urbanization of the county. However, it has been recognized for some time that poor water quality, which might be associated with urban stormwater, now precludes the original back-pumping concept. The county has convinced the Corps that additional structures in the Tamiami Canal west of Sweetwater should be considered critical projects as defined by Congress in the 1996 Water Resource Development Act. The western-most structure will be constructed soon, and if operated properly, could provide some reduction in flooding during major storms.

The second Tamiami Canal structure, to be located roughly at 117th Avenue, proposed as a Critical Project, was incorporated in the Comprehensive Everglades Restoration Plan (CERP). While this structure could provide significant water supply benefits, it is likely to have a mixed impact on flooding. While the diversion of western Tamiami Canal flow to the Snapper Creek Canal would reduce impacts to the communities of Sweetwater and West Miami, conveyance limitations in the C-2 and western C-4 canals would be expected to increase the potential of flooding in the Kendall area. Therefore the Task Force recommends the following:

a. The county should request the immediate implementation of the Corps' critical project on the C-4 Canal (Tamiami) at theoretical N.W. 157th Avenue. Operational rules should be developed which maximize the flood control use of the structure.

b. Other back-pumping alternatives should be considered, including back-pumping into proposed detention area in the Lakebelt and Bird Drive Basin,

c. It is not advisable to construct the proposed 117th Avenue structure until the back-pumping facilities for the Tamiami Canal are in place and an evaluation has been conducted by the Corps to verify that flood protection will be enhanced.

5. **Miami-Dade County Stormwater Management Master Plan.** The county is presently engaged in the development of a countywide Stormwater Management Master Plan (SMMP). The County was divided into four major planning areas for this effort as follows:

1. Northern Basins (C-7, C-8, C-9 West and C-9 East)
2. Southern Basins (C-1, C-102 with Goulds Canal, C-103, North Canal and Florida City Canal)
3. Central Basins (C-2 and C-100)
4. North Central Basins (C-3, C-4, C-5 and C-6)

The Northern Basins' SMMP was completed in September 1997. The Southern Basins are presently being developed and are projected for completion in February 2002. The Central Basins and the North Central Basins are programmed to be completed by 2007.

The SMMP efforts in the northern basins (C-9 East and C-9 West, C-8, and C-7) determined that the main issues with regard to improved flood protection could be addressed by the construction of the following projects:

- Approximately eighteen (18) miles of berms would need to be constructed on both sides of the primary and secondary canal systems in the C-9 East Basin.
- The improvement of the 199th Street Culvert to enhance water deliveries to the primary canal system (Snake Creek), C-9 East Basin, presently under bid.

- Retrofitting of undersized culverts for improved water flow. Basin C-7 showed the most impacts due to flooding of the other basins. Specifically, the Red Road Canal areas were impacted, due to the inefficient capacities of all the culverts south of the Little River Canal that serves the C-7 Basin.
- The Twin Lakes, part of the C-7 Basin, are to be interconnected to improve the overall storage needs of the area during excessive storm events. Bidding is ongoing.
- It was found that of the four basins initially modeled that the C-8 Basin showed the least significant flooding problems.
- Canal capacity should be improved by dredging accumulated silt. The Miami-Dade Public Works Department (PWD) has provided a list of known areas where dredging is recommended and the Department of Environmental Resources Management is programming the surveying of these locations to determine the extent of the work needed.

As additional Basin's SMMP are completed, similar control measures will be identified and recommended for Commission action. The Task Force recommends that:

a. The county should complete its SMMP by 2002 with five-year review and updates.

b. The county should expedite its ongoing development and identification of control measures for implementation as determined by the SMMP in the remaining basins.

c. The SMMP's modeling efforts should be expedited in the central and north central areas of the county to identify appropriate control measures much like those mentioned above for the northern areas, to ensure that the flood protection needs for those areas of the county are addressed.

d. The county should produce an official map of the primary and secondary canal systems for the entire county, including private and publicly-owned canals.

6. **Experimental Water Deliveries to Everglades National Park.** For 17 years, water management operations in the southwest Miami-Dade County region have been governed by criteria developed as part of the federally authorized program of "Experimental Water Deliveries to Everglades National Park (ENP)." Many believe that water levels and structure

operations for the last five years under the program have exceeded the safe limit with respect to flood protection in the urban/agricultural areas of southwest Miami-Dade County. As a result of an emergency declared to protect the Cape Sable Seaside Sparrow the Experimental Water Delivery Program has been discontinued and it is unlikely it will be reactivated in its previous form. The most recent four years under the experimental program have not been documented even though the program required that the agencies complete annual evaluations. These evaluations could produce valuable information to guide future operations in the area so unintended flooding could be avoided. The Miami-Dade County Flood Management Task Force recommends:

a. The District and the Corps should prepare a final comprehensive report, covering the period from November 1, 1995 to December 31, 1999. This report would make definitive hydrologic conclusions about the impact of the canal operations and provide guidance for future actions.

b. The evidence presented indicates that the water levels associated with the Experimental Water Deliveries to the ENP contributed to the flooding during Hurricane Irene in southwest Miami-Dade County. Therefore, the county should recommend to the Corps that the water level conditions which existed during the wet season of 1999 be avoided and that in addition to environmental objectives, flood protection to areas east of ENP be accommodated during future operations.

7. **Modified Water Deliveries and C-111 Projects**. The Modified Water Delivery (MWD) and Canal C-111 Projects have been designed and approved for the express purpose of resolving the conflict between protecting Everglades National Park and Florida Bay and providing residents and businesses with the flood protection that is essential. The County should actively participate in ongoing National Environmental Protection Act (NEPA) processes to define structural and operational changes that will both alleviate some flooding issues, as well as protect water supply and the natural environment. These modifications will reduce the inherent conflicts between the natural system and the developed areas. The MWD and C-111 projects enhance the natural system, especially in Everglades National Park, the Water Conservation Areas, and Florida Bay by increasing flows through the system toward historical levels. The projects also

help the urban and agricultural area in two ways; 1) they permit the lowering of water levels prior to a hurricane and provide significantly greater conveyance during a hurricane, thus decreasing the probability of flooding; and 2) they provide a structural interface between the natural and developed systems, thus permitting water levels to be managed separately for the benefit of both. The Task Force recommends:

a. The County Commission should request that the Corps and District complete the Modified Water Deliveries and C-111 Projects as quickly as possible.

8. **Sparrow Emergency Operations.** The U. S. Fish and Wildlife Service has declared an emergency for the Cape Sable Sparrow (the Sparrow), requiring the Corps to change the way the water management system is operated. These changes have the potential to raise water levels in western Miami-Dade County to levels that would put the area in much greater risk of damaging floods. The Corps has implemented an "Interim Structural and Operational Plan" for the Year 2000 (ISOP). This significantly modified the operations in southern Miami-Dade County. To further comply with the emergency in the years 2001 and 2002, the Corps is preparing a plan to implement the "Interim Operational Plan" (IOP) until the Modified Water Deliveries Project is constructed. Like the ISOP, the IOP will further modify water management operations in southwest Miami-Dade. The Task Force recommends:

   a. The County Commission should recommend to the Corps that any operations related to protecting the Sparrow and its habitat that would result in L31-N canal water levels similar to those maintained during the wet season of 1999 should be avoided and that in addition to environmental objectives, flood protection to areas east of the ENP must be an integral part of any interim operating plan.

   b. The County should play an active role in the formulation of the IOP to ensure that the plan being formulated to protect the Sparrow and its habitat prior to the completion of the Modified Water Deliveries Project, does not unnecessarily affect the residents of Miami-Dade County.

   c. The county should work with the Corps and the District to ensure that more flexible flood control operational criteria are incorporated in the ISOP and IOP. The criteria should stipulate the involvement of the Corps Jacksonville District Engineer and the District

Executive Director along with their respective operations managers, when a serious flooding threat to the region requires decisions which also have the potential to cause serious environmental impacts.

9. **Increase Flood Protection in the CERP.** Within the context of its other project purposes the Corps' Comprehensive Everglades Restoration Plan (CERP) has the potential to maintain or enhance flood protection. The Chief of Engineers, in his June 22, 1999 Report to Congress, stated that flood protection would be maintained to "the extent practicable". Until the Chief of Engineers issued his report flood protection was to be improved throughout the system where possible, but in no case reduced below existing levels. The Chief's report said that, "Such assurance will not, to the extent practicable, impact other existing legal users and flood protection." Miami-Dade County will pay for a significant portion of Everglades restoration and should expect along with ecological and water supply benefits better flood protection where possible. The Task Force recommends:

a. The Miami-Dade County Commission should request that Congress include language in the bill that approves the CERP, a firm commitment to seek to improve local flood control within the context of the ecosystem restoration and water supply enhancements of the CERP.

10. **8½ Square Mile Area.** The residents of the 8½ Square Mile Area (SMA) have endured flooding because of the eleven (11) year delay in implementing the Modified Water Deliveries project. There are several ongoing National Environmental Protection Act (NEPA) processes which determine the final disposition of the 8½ SMA. The Task Force Recommends:

a. Once the final disposition of the 8½ SMA is determined, the county should, if necessary, begin the planning to ensure roads and drainage systems compatible with the chosen project.

b. Work with the residents of the area to establish a special taxing district within the 8½ SMA to defray costs of internal drainage and other services.

c. Immediately take steps to ensure access and egress for residents during hurricane conditions.

d. As an interim measure, the county should seek permission from the District to connect the roadside ditch along S.W. 168th Street, south of the 8½ SMA into the L31-N. The permitting process will include addressing environmental concerns with the runoff.

e. The Task Force heard conflicting testimony regarding allegations of discrimination during the post-storm emergency with respect to government assistance in obtaining flood relief for the 8½ SMA. The Task Force recommends that the County Commission should refer the issue of alleged discrimination against the 8½ SMA residents to an appropriate review body.

11. **Municipal Improvement Initiatives.** The Task Force recommends that the municipalities should continue to seek assistance from appropriate agencies for the construction of capital drainage improvements, which may include the installation of pumping systems. The municipalities should work within the framework of the regional system, and their solutions must be considered in the context of the regional system by the permitting agencies. The success of local solutions is often dependent on establishing improved conditions in the primary canal system. In order for this to work, all communities must coordinate their drainage activities with the county and the District to ensure that the regional system functions efficiently. Water quality must be an integral component of this planning.

12. **Cut and Fill Criteria.** The Task Force recommends that Miami-Dade County should evaluate the need for extending the fill restrictions (Miami-Dade County Fill Encroachment and Water Management Criteria, [Cut and Fill Criteria], refer to Appendix F), to other areas in southwest Miami-Dade County, beyond the present limits of the original boundaries of Area B.

Study and implement, if necessary, new cut and fill criteria for new development. This may include higher house pad and road elevations and greater on-site stormwater retention. Miami-Dade County should review and upgrade the criteria for development in areas of the county that are known to be flood prone. This evaluation should be done in all flood prone areas of the county regardless of how they are currently mapped or zoned.

13. **FEMA Insurance Maps.** The Task Force recommends that Miami-Dade County should request that the Federal Emergency Management Agency (FEMA) update their insurance rate maps countywide. This is based on the fact that there has been extensive land development since the last update in 1994 by FEMA. The results of this process should be compared to the existing County Flood Criteria maps so that the more stringent elevation is used. Miami-Dade County should also work with FEMA to identify willing sellers in flood-prone areas and purchase those properties under existing federal buy-out programs.

14. **Operation of S-197.** S-197 is the structure at the southern end of the C-111 canal. It is the final outlet for the largest drainage area in the county and, coupled with the C-111 overbank flow down stream of the S-18C water control structure, is an important feature of the flood control system that currently serves the agricultural and residential areas east and west of Krome Avenue, from Tamiami Trail to Florida City during severe storm events. The system of overbank flow and S-197 discharge is capable of passing significant amounts of water out of south Miami-Dade County during times of major rainfall events. Unfortunately, the structure itself is cumbersome to operate. Three culverts are opened and closed manually, and the other ten can only be operated by heavy equipment that must be transported to the site. Complicating the matter is that, to be effective, the culverts must be closed and opened in response to changing tides during a major event to not only permit the release of excess flood waters but, in reverse, prevent tidal actions from compounding upstream flooding. As is typical for the current configuration, during Irene this inflexibility limited the effectiveness of S-197. None of the gates could be opened and closed in response to the tide. In this regard, it is important to note that tropical storm tidal surge in the low-lying areas of C-111 will at times negate any overflow and S-197 discharge capabilities. The Task Force therefore recommends:

a. The District and Corps should investigate options for improving the operational flexibility of the S-197 structure to improve its performance during flood events. This investigation should include potential impacts to Barnes Sound.

15. **Florida City and North Canals.** These two canals provide important flood protection to a significant amount of agricultural and urban property near Homestead and Florida City. Although the county holds a flowage easement over the canal itself, no maintenance work is done because the county does not own the adjacent right-of-way. The lack of maintenance creates an unacceptable risk to people and property in the area. The Task Force recommends:

a. The county should evaluate the requirements for maintaining these canals. The evaluation should involve discussions with the adjacent property owners that now own the canal rights-of-way, to see under what conditions the ownership could be reconciled and canal maintenance provided.

16. **Identify flood prone areas in the unincorporated County.** There are a number of low-lying areas of unincorporated Miami-Dade County which were flooded during Hurricane Irene. The Task Force recommends.

a. These areas need to be evaluated and the county should implement programs to improve flood protection in these areas.

17. **Seepage Management.** Preliminary calculations indicate easterly seepage in flows to urban and agricultural areas across the L-33, L-30 and L-31 North levees. This seepage may contribute significantly to flooding during severe storms. The Task Force recommends:

a. CERP plans for seepage management along the eastern edge of the Water Conservation Areas and Everglades National Park should consider flooding impacts to urban and agricultural areas.

18. **FEC-Borrow Canal.** Drainage for the Village of Virginia Gardens is dependent upon adequate maintenance of the canal on its western boundary. The Village has indicated that the canal has been blocked by aquatic vegetation, which adversely impacts the drainage of the canal. The Task Force recommends:

a. Maintenance of this canal is increased to eliminate any blockage, and that the county evaluate the method to determine whether connection to the C-6 canal is adequate.

4. Description of the Flood Management Task Force Process:

On October 19,1999, through Resolution R-1164-99 (Appendix A) the Board of County Commissioners created the Miami-Dade County Flood Management Task Force (Task Force) in response to the severe flooding experienced in Miami-Dade County as a result of Hurricane Irene. The Task Force was charged with conducting public meetings in order to prepare and submit a written report to the Board of County Commissioners by June 1, 2000. The Task Force consisted of members appointed by each Commissioner, with one appointment each from the County Manager's Office and the South Florida Water Management District Executive Director's Office. A complete list of the Task Force members is provided in Appendix B.

The Miami-Dade County Department of Environmental Resources Management (DERM) was designated by the County Manager to act as staff to the Task Force.

Meetings:

The first meeting of the Task Force was held on November 3, 1999. At this meeting the Chairperson and the Vice-Chairperson were elected by the Task Force members in attendance. The Task Force held ten (10) meetings throughout the county to better reach the citizens in those areas affected by the flooding caused by Hurricane Irene.
All meetings were advertised and recorded. The agendas and minutes of the Task Force meetings are provided in Appendix C.

Listed Presentations

The following presentations were given to the Miami-Dade County Flood Management Task Force during meetings from November 18th, 1999 to March 14th, 2000. Further information on the presentations may be found in the listed Appendices:

PRESENTATIONS	APPENDIX
Army Corps of Engineers	D
South Florida Water Management District Hurricane Irene Report	E
Miami-Dade County Information on Hurricane Irene Impacts and Quality Neighborhood Improvement Program (QNIP) Efforts	F
Miccosukee Tribe	G
Residents of the 8½ Square Mile Area (8½ SMA)	H
Everglades National Park	I
South Florida Water Management District Re-Study and Modified Water Deliveries	J
City of Sweetwater	K
City of West Miami	L
South Dade Agricultural Interests – Miami-Dade County Extension Office	M
Village of Virginia Gardens	N
City of Hialeah	O
City of North Miami	P
City of Opa-Locka	Q
City of Homestead	R
City of Miami Springs	T